MARCHS POND

2017 SAMPLING HIGHLIGHTS

Station 1 Deep

New Durham, NH

Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that were collected near the lake bottom.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

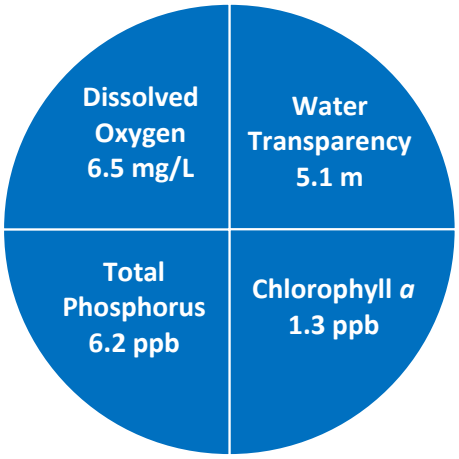


Figure 1. Marchs Pond Water Quality (2017)

Table 1. 2017 Marchs Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

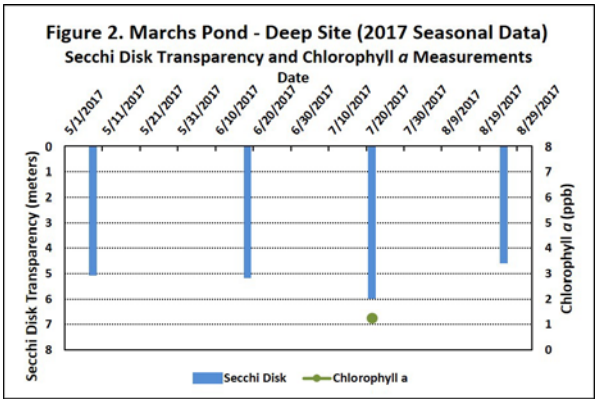
Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Marchs Pond Average (range)	Marchs Pond Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**5.1** meters (4.5 – 5.9)*	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**1.3** ppb (single value)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**6.2** ppb (5.1 – 7.8)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**6.5** mg/L (1.6 – 8.3)	Oligotrophic

* Secchi disk was visible on the bottom for one or more readings and thus likely underestimates water clarity.

**Dissolved oxygen data were measured in Marchs Pond on July 21, 2017 between 2.0 m to 6.0 m, in the layer of rapidly declining temperature.

Table 2. 2017 Marchs Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Marchs Pond Average (range)	Marchs Pond Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**11.8** color units (single value)	Slightly colored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	**5.0** mg/L (range: 4.4 – 6.0)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.3** standard units (range: 7.1 – 7.5)	Optimal range for fish growth and reproduction
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		**86.9** *u*S/cm (range: 83.1 – 90.5)	Characteristic of lakes with some human influence



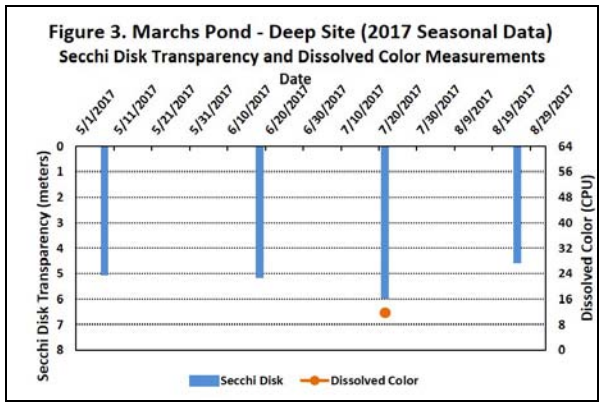
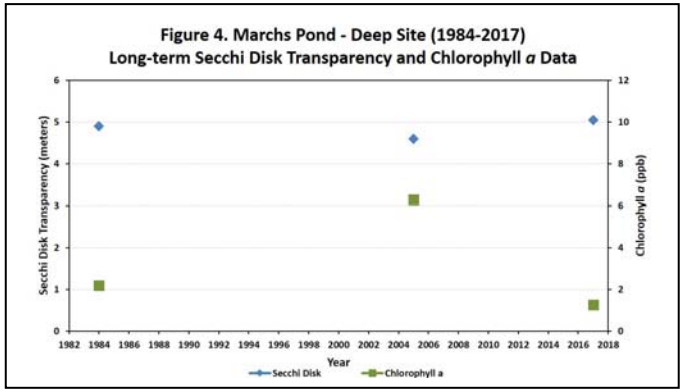


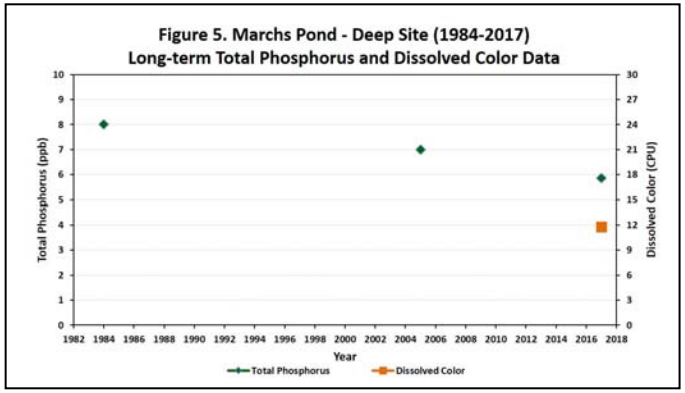
Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

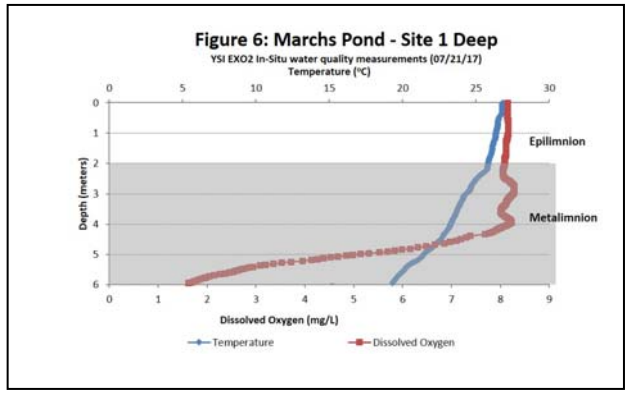
Table 3. New Durham Ponds inter-comparison (2017 Data)

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Chlorophyll *a* (ppb)	Average (range) Total Phosphorus (ppb)	Average (range) Dissolved Color (CPU)	Average (range) Dissolved Oxygen (mg/l)
Merrymeeting Lake	10.5 meters (range: 8.3 – 12.2)	1.0 *u*g/l (range: 0.4 – 2.0)	4.5 *u*g/l (range: 2.0 – 7.3)	5.5 CPU (range: 2.6 – 7.9)	11.2 mg/l (range: 10.0 – 11.8)
Marsh Pond	3.2 meters (range: 2.5 – 4.3)	11.9 *u*g/l (range: 6.9 – 30.5)	33.9 *u*g/l (range: 18.7 – 65.1)	24.2 CPU (range: 18.6 – 31.9)	1.9 mg/l (range: 0.1 – 3.1)
Jones Pond	3.3 meters (range: 2.7 – 3.8)	6.1 *u*g/l (single value)	21.7 *u*g/l (range: 18.7 – 25.8)	25.0 CPU (single value)	3.1 mg/l (range: 0.9 – 6.7)
Downing Pond	3.1 meters (range: 2.7 – 3.4)	5.3 *u*g/l (range: 3.8 – 6.8)	20.5 *u*g/l (range: 15.6 – 25.7)	31.5 CPU (range: 25.7 – 37.2)	------
Chalk Pond	3.2 meters (range: 2.8 – 3.8)	1.7 *u*g/l (single value)	9.4 *u*g/l (range: 6.7 – 12.6)	13.7 CPU (single value)	------
Marchs Pond	5.1 meters (range: 4.5 – 5.9)	1.3 *u*g/l (single value)	6.2 *u*g/l (range: 5.1 – 7.8)	11.8 CPU (single value)	6.5 mg/l (range: 1.6 – 8.3)
Shaws Pond	4.3 meters (range: 4.1 – 4.4)	2.7 *u*g/l (single value)	7.8 *u*g/l (range: 5.8 – 9.8)	45.5 CPU (single value)	4.7 mg/l (range: 0.2 – 8.2)

- Water quality data are reported for a deep reference sampling location in each lake/pond.
- Dissolved oxygen measurements were collected in the summer (late July and August) in the bottom water layer (hypolimnion or metalimnion).
- Chalk, Marchs, and Downing Ponds Secchi Disk transparency measurements intermittently reached the lake bottom before disappearing from view and likely underestimate the water transparency.
- ------ Indicates the site is too shallow to form a stable deep water layer (hypolimnion or metalimnion) during the summer months.







Figures 4 and 5. Changes in the Marchs Pond water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 and 2017. **Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.**

Figure 6. Marchs Pond profile of temperature and dissolved oxygen concentrations collected on July 21, 2017. *Notice the decreasing dissolved oxygen concentrations near the lake bottom.*

Recommendations

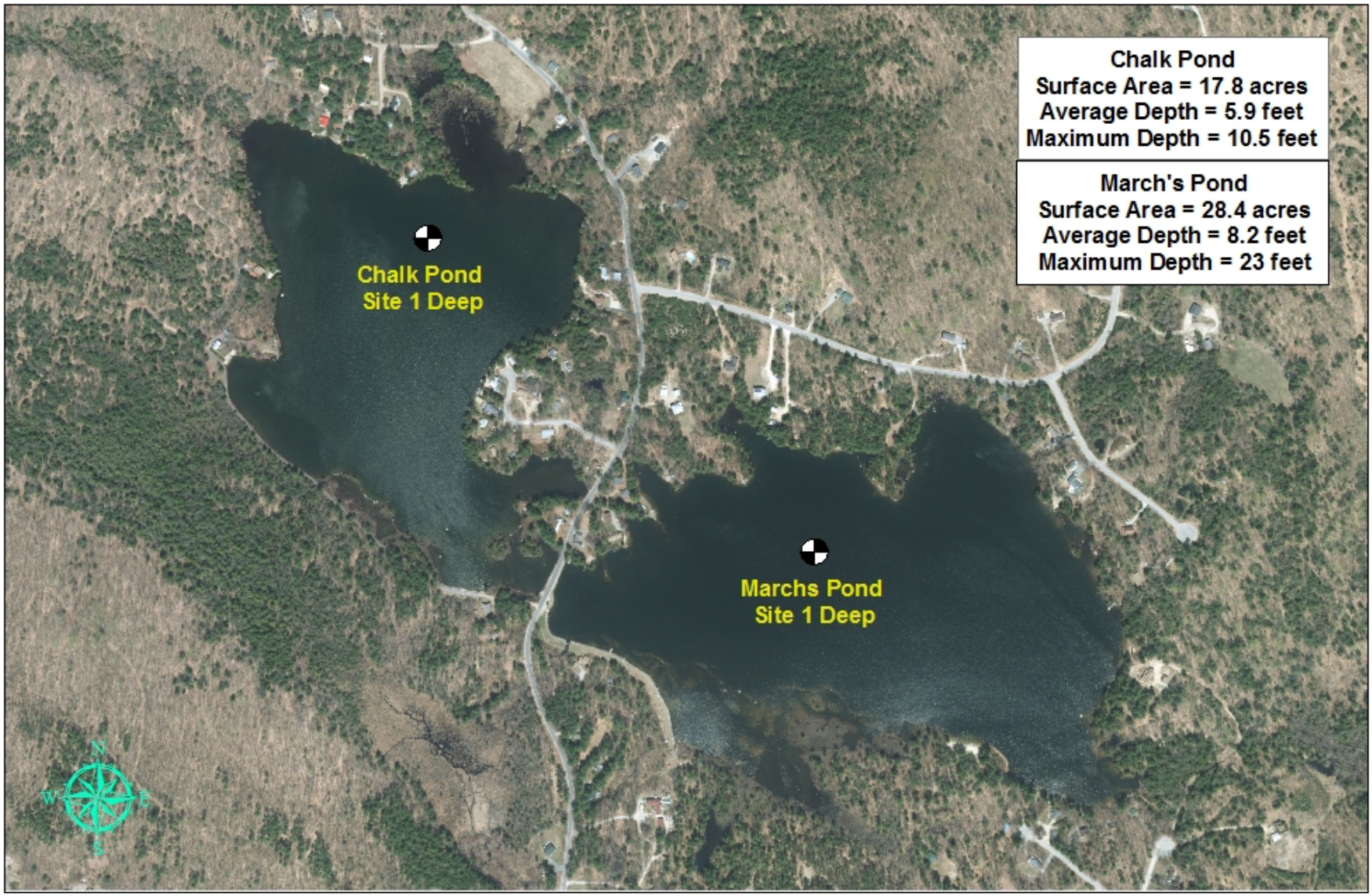
Implement Best Management Practices within the Marchs Pond watershed to minimize the adverse impacts of polluted runoff and erosion into Marchs Pond. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- http://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf

Figure 7. Chalk Pond and Marchs Pond

New Durham, NH

2017 Deep water sampling sites



Aerial Orthophoto Source: NH GRANIT
GPS Coordinates collected by the UNH Center for Freshwater Biology

NH Extension